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## (54) A bottle washing-sterilizing apparatus

(57) A bottle washing-sterilizing machine comprises a drum 3 which rotates around tanks containing germicidal and/or bactericidal liquids and from which extend hollow arms 2 carrying jaws 13, 14 and an injector, and which can be swung upwardly to tilt a bottle 1 for drainage via a pinion and rack located within each arm 2. The rack has a stem 7 provided with a wheel 8 which runs around the periphery of a cam 10 about which the drum 3 rotates, said jaws 13, 14 being movable relative to each other by means of a wheel 16 engaged with a further cam 18. The fixed jaw 13 has a feeler 20 which operates a valve in the injector.

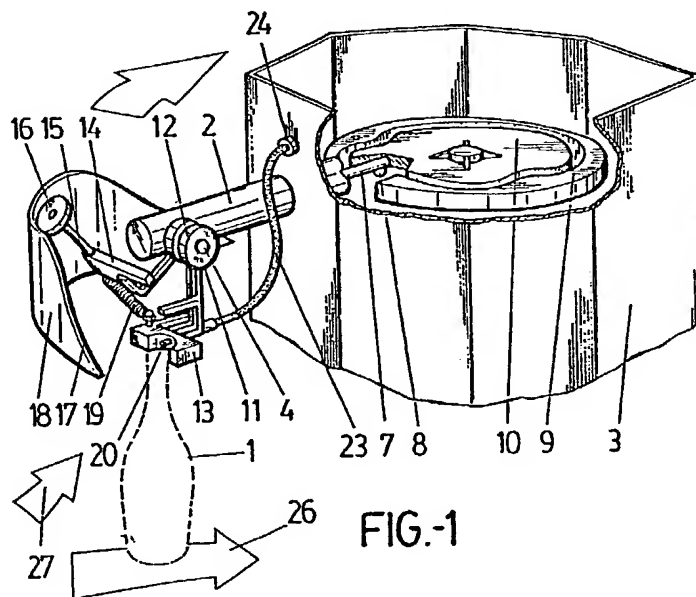
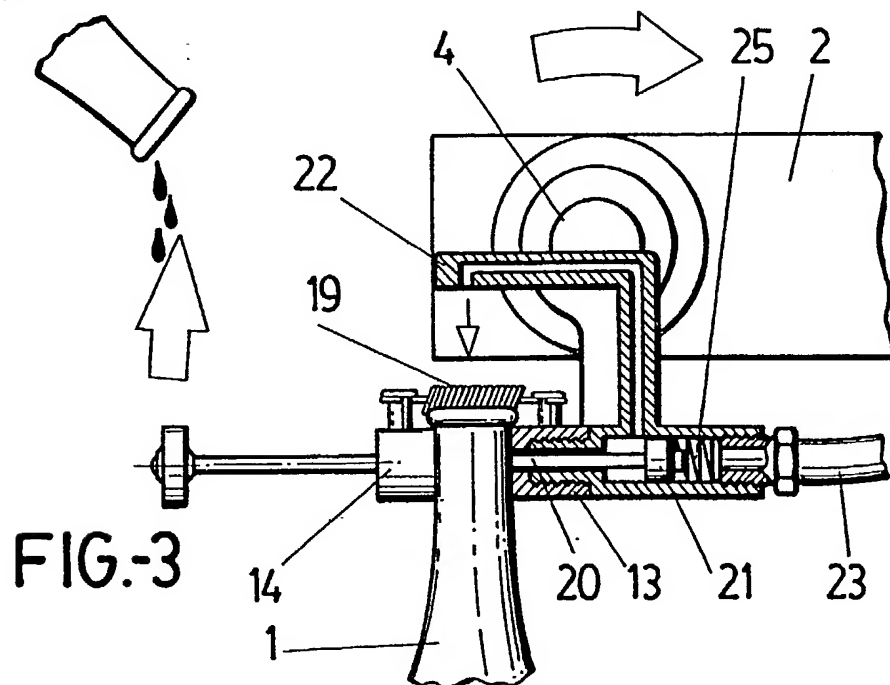
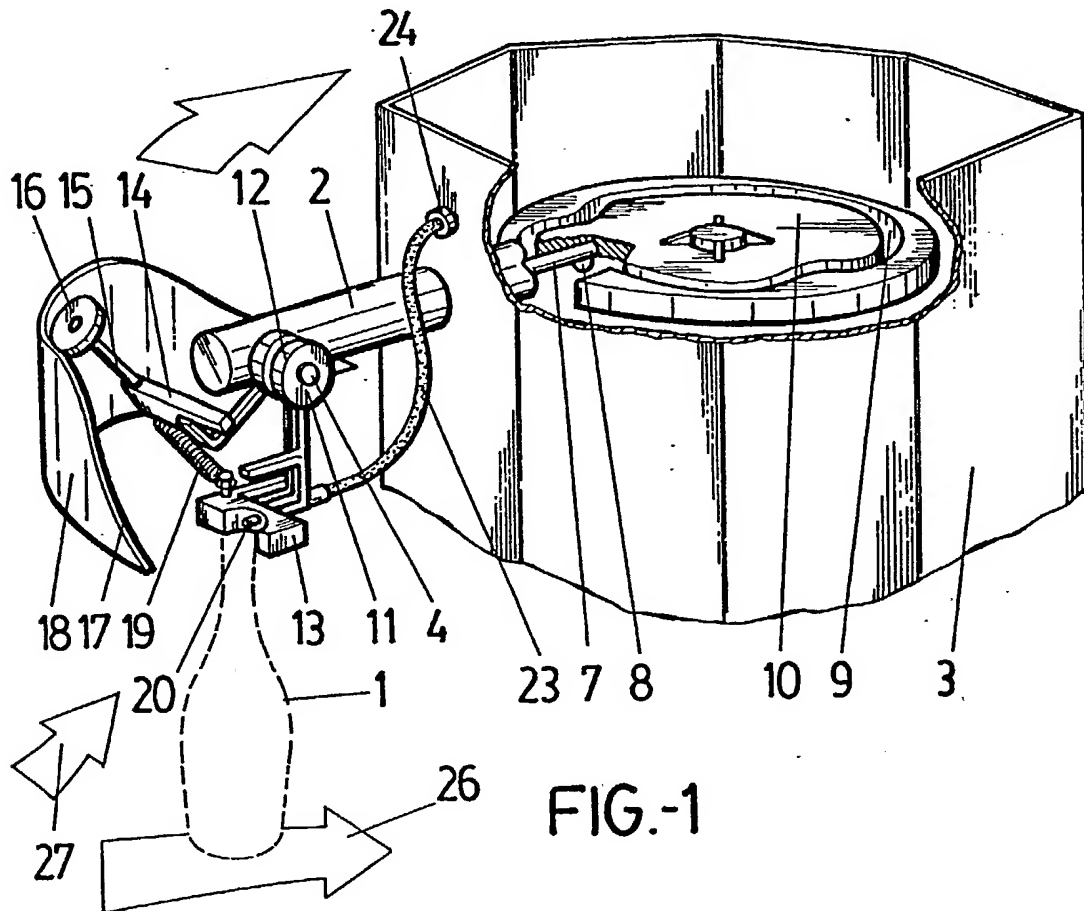


FIG.-1

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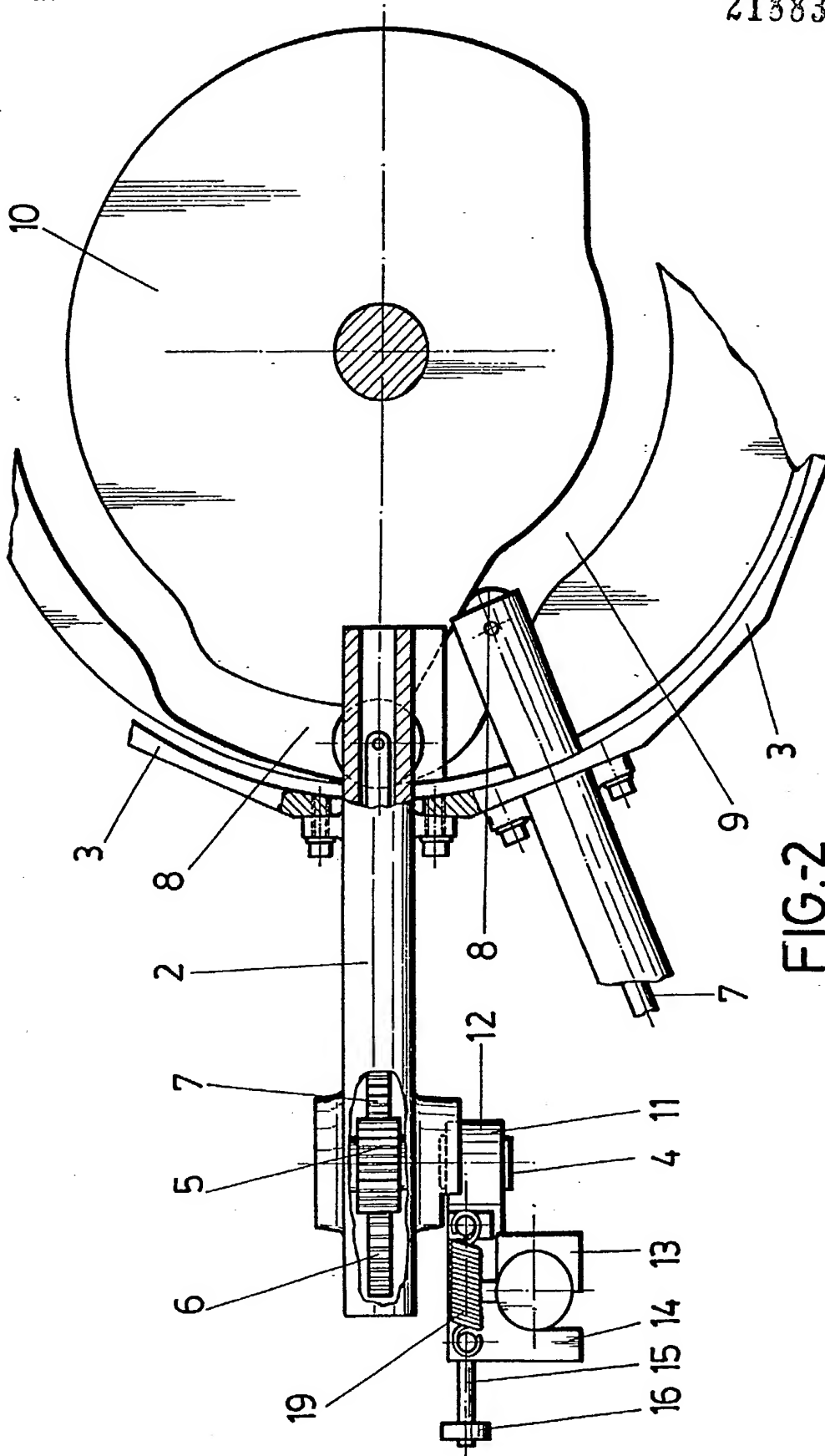


FIG. 2

## SPECIFICATION

### A bottle washing-sterilizing apparatus

5 The present invention relates to a bottle washing-sterilizing apparatus.

Bottle washing-sterilizing machines are used to sterilize bottles to ensure that before they are filled with liquid there is a total absence of germs and  
10 bacteria inside the bottles.

A bottle washing-sterilizing machine consists basically of two or more tanks holding cleaning and disinfecting or sterilizing products, among which are water and alcohol, and an injection means having a  
15 pressure spray which is directed into the interior of the bottles.

The bottles to be washed and sterilized are transported by mechanical conveyor means towards the injection means so that these spray into the  
20 bottle, carrying out the washing and sterilizing in different, successive phases among which should be mentioned the action of bactericidal or germicidal products and rinsing with sterilized water. After spraying, the bottle must be held upside down to drain, and this is done by other mechanical means in  
25 such a way that the bottle is kept upside down during a run which is sufficient for draining to occur.

The means for transporting the bottles are usually conventional and consist essentially of those means used normally in bottle filling plants, the means used for spraying the cleaning and disinfecting liquids are injection nozzles of the same type as used in filling  
30 plants.

Washing-sterilizing machines can be divided into  
35 two classes, one of which includes the so-called linear path machines, while the other includes the so-called circular path machines. Linear path machines have a fundamental problem in their size, since they occupy a very large space and, in spite of the apparent simplicity of their mechanical  
40 elements, they are in fact expensive to build and complicated precisely because of the excessive length of the transmission belts and the turn axles and synchronisations which allow the correct  
45 functioning of each one of the moving parts.

Circular path machines, however, are more compact, and more easily set up and produce more satisfactory results.

Basically, a circular path washing-sterilizing  
50 machine is made up of a drum rotatable around two or more tanks containing bactericidal and/or germicidal liquids, with outlet valves at the openings of various injection nozzles placed in the drum in such a way that as it turns the alignment of one with  
55 the other determines the outflow of liquids. Each injection nozzle is in contact with a spray element which is located above clamps in which are placed the bottles to be sterilized and washed. The clamps have means for opening and closing jaws which are  
60 usually pneumatic or mechanical, and their activation and synchronisation is effected by feelers.

One of the most commonly used mechanical solutions with a circular drum consists of hinged arms holding the clamps, and by means of feelers  
65 which follow cams whose profile determines the

rising movement of the arms which, with the clamps and bottles, reaches an inclination necessary for filling or draining the bottles.

The clamps open in the same plane and then close  
70 on the bottle; a feeler acts as a sensor for the filling nozzle and the different cycles take place without interruption.

This solution has two variations, one with an external enveloping lever which leaves little space  
75 for the arms and clamps, and another with an internal lever which causes a very forced following motion with great mechanical fatigue.

However, both solutions appear simple and are therefore used by different manufacturers, but  
80 problems exist because it is difficult to reach the injectors and clamps, and the means of regulation require great attention, and on the other hand the clamps demand a very precise synchronisation and the feelers do not always act correctly, so that  
85 frequently liquid injections occur which do not find a recipient bottle to receive them.

According to the present invention there is provided a bottle washing-sterilizing apparatus, comprising a drum which rotates around tanks  
90 containing germicidal and/or bactericidal liquids and from which extends a plurality of nozzles for injecting the liquids into the neck of the bottles which are then turned neck downwards to drain the germicidal and/or bactericidal liquids therefrom, wherein the bottles are held by pairs of jaws which  
95 are situated at the end of fixed hollow arms which extend from the drum which is rotatable about its longitudinal axis, said jaws being attached to transverse axles connected to a pinion which is engaged with a rack located inside the arm, said rack  
100 being continued by a stem provided at one end with an idle wheel which runs around the periphery of a fixed cam around which the drum revolves.

The mechanical system is simplified because the  
105 arm is rigid, the clamps hang down, raising the bottle during the drying stage and only one of the jaws opens relative to the other.

There is an internal cam without great mechanical load and a very short external cam is provided which  
110 is used only to open the clamps to release and pick-up the bottles.

On the other hand, since the nozzle is mounted on the clamp itself, the possibility of an injection occurring outside the bottle is totally eliminated.

115 An embodiment of the invention will now be described, by way of an example, with reference to the accompanying drawings, in which:-

*Figure 1* is a partial view in perspective of a washing-sterilizing machine in accordance with the  
120 present invention,

*Figure 2* is a plan view of the machine, and

*Figure 3* is a front part sectional detail at the level of the bottleneck during the washing and sterilizing phase.

125 The bottles 1 are held by pairs of clamps which are provided on the outer ends of fixed arms 2 which extend from a drum 3 which is cylindrical or multi-sided, and which rotates around its longitudinal axis.

130 The clamps are carried on axles 4 which extend

transversely of the arms 2 which are hollow and in which a pinion 5 is provided which is engaged with an internal rack 6 extending along the arm 2.

The rack 6 is continued by a stem 7 provided with an idle wheel 8 which runs along a track 9 formed by a fixed cam 10 that the drum 3 rotates relative thereto.

The action of the idle wheel 3 on the stem 7 determines through the pinion 5 and rack 6, the tilting movement of each one of the pairs of clamps during movement from the position where the germicide or bactericide material is injected up to the position where draining takes place.

Each one of the pairs of clamps are formed by a first clamp part 11 fixed to the axle 4 of the pinion 5 located inside the arm 2 and second clamp part 12 movable with respect to the arm 2, both parts 11, 12 being formed by sockets from which radial arms extend which are bent at their outer end to support the respective jaws 13, 14 of the clamps which form a seating for receiving the neck of the bottle 1 that they immobilise.

The socket part 11 which is the fixed part of the clamp is joined to the axle 4 and when the said axle 4 rotates because of the rack 6 pushed by the profile of the cam 10 and rotation of the pinion 5 this, in turn, causes the socket part 12 to rotate with it, and since the socket part 12 through its arm is joined to the jaw 13, it is the jaw 13 itself which makes jaw 14 rise, with the gripping action on the bottle 1 maintained due to the action of a spring 19, in such a way that, following the profile of the cam 10, a run occurs with the bottle 1 inclined in a draining position.

The jaw 14 has a stem 15 ending in a wheel 16 which follows the crest or edge 17 of an external section of a cam 18 which determines the opening of the jaw by the upward tilting of the jaw 14 with respect to the other jaw 12 which is fixed. The jaw 14 is moved against the tension of tension spring 19 mentioned previously, thus ensuring the closure of the jaws which hold the bottles.

The fixed jaw 13 has a feeler 20 which is positioned radially with respect to the neck of the bottle 1 and which is moved by the latter to operate a valve allowing the passage of germicidal or bacterial liquid into the bottle 1 through a nozzle 32.

This feeler 20 has a cylindrical valve member 21, axially perforated to allow the passage of the liquid, but which closes the delivery passage against the flow of germicidal or bactericidal liquid; the said nozzle 22 has a swan neck shape and communicates through the member 21 with a flexible tube 23 connected via cylindrical connections 24 to the tanks containing the germicidal or bactericidal liquids.

Between the valve 21 and a support opposite the feeler, is placed a spring 25 which tends to move the valve 21 and feeler to the closed position when there is no bottle 1 between the jaws 13, 14.

The arrow 26 indicates the direction and position of a conventional conveyor device to remove clean bottles 1, while arrow 27 indicates the action and direction of a conveyor device which supplies bottles to be washed and sterilized.

It is not considered necessary to extend this description further for any expert in this field will

understand the extent of the invention and the advantages derived from the same.

The materials, shape, size and layout of the elements may be varied without departing from the invention as defined in the appended claims.

## CLAIMS

1. A bottle washing-sterilizing apparatus, comprising a drum which rotates around tanks containing liquids at least one of which is germicidal and/or bactericidal, and from which extends a plurality of nozzles for injecting the liquids into the rack of the bottles which are then turned rack downwards to drain the germicidal and/or bactericidal liquids therefrom, wherein the bottles are held by pairs of jaws which are situated at the end of fixed hollow arms which extend from the drum which is rotatable about its longitudinal axis, said jaws being attached to transverse axles connected to a pinion which is engaged with a rack located inside the arm, said rack being continued by a stem provided at one end with an idle wheel which runs around the periphery of a fixed cam around which the drum revolves.

2. A bottle washing-sterilizing apparatus as claimed in claim 1, in which the rotation of the pinion due to movement of the idle wheel around the cam and movement of the rack unit causes the rising tilting movement of each of the sets of jaws when moving from the position of injection of the germicidal and/or bactericidal liquids to the position of drainage.

3. A bottle washing-sterilizing apparatus as claimed in claim 1 or claim 2, in which each of the pairs of jaws is made up of a first fixed jaw part driven by the pinion and a second mobile jaw part movable relative to the first jaw part, both jaw parts comprising sockets from which extend radial arms which at their free end support the jaws which clamp around the neck of the bottle which they receive.

4. A bottle washing-sterilizing apparatus as claimed in any preceding claim, in which one of the jaws is provided with a stem ending in a wheel which follows the crest of an external cam to effect the opening of the jaws by pivoting one of the jaws relative to the other against the force of a tension spring which ensures the closures of the jaws when a said bottle has been placed between the jaws.

5. A bottle washing-sterilizing apparatus as claimed in any preceding claim, in which the fixed jaw has a feeler extending radially with respect to the neck of the bottle and which is displaced by the bottle to open a passage for the germicidal and/or bactericidal liquid, said feeler having a perforated cylindrical valve member which in one position allows the flow of the germicidal and/or bactericidal liquid axially across the valve member, and which in another position closes the flow passage to an injector nozzle which communicates through the valve member with a flexible conduit connected via the cyclical connectors to tanks containing germicidal and/or bactericidal liquid, a spring being placed between the valve member and a support located opposite the feeler, which urges the

feeler/valve to the closed position when there is no bottle located between the jaws.

6. A bottle washing-sterilizing apparatus substantially as hereinbefore described with  
5 reference to and as illustrated in the accompanying drawings.

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